22. (Amended) An optical spectroscopic method, comprising:

filtering a plurality of radiation beam portions for different positions in a sample area with a plurality of portions of a filter each having different wavelength response characteristics, with the filter at a first position,

detecting the plurality of radiation beam portions with different parts of a spatial detector after filtering the radiation beam portions in the step of filtering,

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moving the filter to a second position relative to a detector used in the step of detecting,

again filtering the plurality of radiation beam portions with a plurality of portions of the filter each having different wavelength response characteristics, with the filter at the second position,

again detecting the plurality of radiation beam portions with different parts of a spatial detector after filtering the radiation beam portions in the step of again filtering, and

deriving spectral information from data acquired in the steps of detecting and again detecting.

39. (Amended) A two-dimensional imaging optical instrument for acquiring images of a two-dimensional sample area irradiated by a source, comprising:

a two-dimensional spatial detector having detector elements aligned along a first axis and a second axis,

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a two-dimensional variable filter having filter characteristics that vary in at least one dimension, wherein there is an optical path from the variable filter to the spatial detector, and

an optic operative to image radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and

an actuator operatively connected to at least one of the source, the optic, the variable filter, the sample and the spatial detector, and operative to move at least the one of these elements with respect to at least another of these elements, while the optic images the radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and wherein the actuator is driven by the instrument to enable detection of a predetermined sample area by a predetermined spatial detector area at a predetermined time.

58. (Amended) An optical spectroscopic method, comprising:

filtering a plurality of radiation beam portions for a first set of different positions in a sample area with different wavelength response characteristics at different spatial positions,

detecting the plurality of radiation beam portions with different parts of a spatial detector after filtering the radiation beam portions in the first step,

successively filtering further pluralities of radiation beam portions for further sets of different positions in the sample area with the same wavelength response characteristics at the same spatial positions after the steps of filtering and detecting, wherein the further sets of positions are different from the first set and from each other, and

successively detecting the further pluralities of radiation beam portions with different parts of a spatial detector after filtering the further pluralities of radiation beam portions, and

deriving spectral information about predetermined positions in the sample from data acquired in the steps of detecting and successively detecting.

Please add the following claims.

124. (New) The apparatus of claim 1 further including a an optic operative to image radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and wherein the an actuator is operative to move the variable filter with respect to the spatial detector along the direction in which the wavelength characteristics vary while the optic images the radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics.

125. (New) An imaging optical instrument for acquiring images of a sample area, comprising:

a spatial detector including a plurality of aligned detector elements,

a variable filter having filter characteristics that vary in at least one direction,

a sample platform for supporting a sample in the sample area, and

an actuator operatively connected between the sample platform and the variable filter and operative to move the sample platform relative to the variable filter along the direction in which the filter characteristics vary.

126. (New) The apparatus of claim 125 further including a an optic operative to image radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and wherein the an actuator is operative to move the sample platform with respect to the spatial detector along the direction in which the wavelength characteristics vary while the optic images the radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics.

127. (New) The apparatus of claim 125 wherein the variable filter is a variable band-pass filter.

128. (New) The apparatus of claim 125 further including an infrared source and wherein the spatial detector is an infrared detector.

129. (New) The apparatus of claim 125 further including a near infrared source and wherein the spatial detector is a near infrared detector.

130. (New) The apparatus of claim 125 further including an ultraviolet source and wherein the spatial detector is an ultraviolet detector.

131. (New) The apparatus of claim 125 further including a visible light source and wherein the spatial detector is a visible light detector.

132. (New) The apparatus of claim 125 further including a narrow-band source and wherein the spatial detector and the variable filter are operative on wavelengths outside of the bandwidth of the source.

133. (New) The apparatus of claim 125 further including logic responsive to the spatial detector to combine a series of images from the spatial detector to obtain spectral images.

134. (New) The apparatus of claim 125 further including logic responsive to the spatial detector to combine data from a series of image pixels from images acquired by the spatial detector to obtain individual pixel spectra.

135. (New) The apparatus of claim 125 further including the step of shifting acquired data on a line-by-line basis as it is being acquired.

136. (New) The apparatus of claim 125 further including a first stage optic between the sample and the detector.

137. (New) The apparatus of claim 136 wherein the first stage optic is an image formation optic.

138. (New) The apparatus of claim 125 further including logic responsive to the detector to selectively display spectral information that relates to at least one predetermined substance in the sample.

139. (New) The apparatus of claim 125 further including multivariate spectral analysis logic responsive to data acquired by the detector.

140. (New) The apparatus of claim 125 wherein the spatial detector is a two-dimensional array detector.

141. (New) An imaging optical instrument for acquiring images of a sample area, comprising:

a spatial detector including a plurality of aligned detector elements,

a variable filter having filter characteristics that vary in at least one direction,

a mirror, and

an actuator operatively connected between the mirror and the variable filter and operative to move the mirror relative to the variable filter such that radiation from one sample point passes through parts of the variable filter that have different filter characteristics before reaching the spatial detector.

142. (New) The apparatus of claim 141 further including a an optic operative to image radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and wherein the an actuator is operative to move the mirror with respect to the spatial detector along the direction in which the wavelength characteristics vary while the optic images the radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics.

143. (New) The apparatus of claim 141 wherein the variable filter is a variable band-pass filter.

144. (New) The apparatus of claim 141 further including an infrared source and wherein the spatial detector is an infrared detector.

145. (New) The apparatus of claim 141 further including a near infrared source and wherein the spatial detector is a near infrared detector.

146. (New) The apparatus of claim 141 further including an ultraviolet source and wherein the spatial detector is an ultraviolet detector.

147. (New) The apparatus of claim 141 further including a visible light source and wherein the spatial detector is a visible light detector.

148. (New) The apparatus of claim 141 further including a narrow-band source and wherein the spatial detector and the variable filter are operative on wavelengths outside of the bandwidth of the source.

149. (New) The apparatus of claim 141 further including logic responsive to the spatial detector to combine a series of images from the spatial detector to obtain spectral images.

150. (New) The apparatus of claim 141 further including logic responsive to the spatial detector to combine data from a series of image pixels from images acquired by the spatial detector to obtain individual pixel spectra.

151. (New) The apparatus of claim 141 further including the step of shifting acquired data on a line-by-line basis as it is being acquired.

152. (New) The apparatus of claim 151 wherein the first stage optic is an image formation optic.

153. (New) The apparatus of claim 141 further including logic responsive to the detector to selectively display spectral information that relates to at least one predetermined substance in the sample.

154. (New) The apparatus of claim 141 further including multivariate spectral analysis logic responsive to data acquired by the detector.

155. (New) The apparatus of claim 141 wherein the spatial detector is a two-dimensional array detector.

156. (New) An imaging optical instrument for acquiring images of a sample area, comprising:

a spatial detector including a plurality of aligned detector elements,

a variable filter having wavelength response characteristics that vary in at least one spatial direction,

an optic operative to image radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics, and

an actuator operatively connected between two of a sample platform, the optic, the variable filter, and the spatial detector and operative to move one of the two with respect to the other along the direction in which the wavelength characteristics vary while the optic images the radiation that has interacted with the whole surface of the sample area onto the spatial detector through a plurality of portions of the variable filter having different wavelength response characteristics.

157. (New) The apparatus of claim 156 wherein the actuator is operative to move the sample platform and the filter with respect to each other.

158. (New) The apparatus of claim 156 wherein the variable filter is a variable band-pass filter.

159. (New) The apparatus of claim 156 further including an infrared source and wherein the spatial detector is an infrared detector.

160. (New) The apparatus of claim 156 further including a near infrared source and wherein the spatial detector is a near infrared detector.

161. (New) The apparatus of claim 156 further including an ultraviolet source and wherein the spatial detector is an ultraviolet detector.

162. (New) The apparatus of claim 156 further including a visible light source and wherein the spatial detector is a visible light detector.

163. (New) The apparatus of claim 156 further including a narrow-band source and wherein the spatial detector and the variable filter are operative on wavelengths outside of the bandwidth of the source.

164. (New) The apparatus of claim 156 further including logic responsive to the spatial detector to combine a series of images from the spatial detector to obtain spectral images.

165. (New) The apparatus of claim 156 further including logic responsive to the spatial detector to combine data from a series of image pixels from images acquired by the spatial detector to obtain individual pixel spectra.

166. (New) The apparatus of claim 156 further including the step of shifting acquired data on a line-by-line basis as it is being acquired.

167. (New) The apparatus of claim 156 wherein the first stage optic is an image formation optic.

168. (New) The apparatus of claim 156 further including logic responsive to the detector to selectively display spectral information that relates to at least one predetermined substance in the sample.

169. (New) The apparatus of claim 156 further including multivariate spectral analysis logic responsive to data acquired by the detector.

170. (New) The apparatus of claim 156 wherein the spatial detector is a two-dimensional array detector.

REMARKS

These remarks are in response to the office action mailed January 29, 2003.

Claim 1, as now presented, relates to an imaging optical instrument for acquiring images of a sample area. It includes a spatial detector with a plurality of aligned detector elements and a variable filter with wavelength response characteristics that vary in at least one spatial direction. An actuator is operatively connected between the variable filter and the spatial detector and is operative to move the variable filter relative to the spatial detector along the spatial direction in which the wavelength response characteristics vary, while maintaining at least some concurrent optical paths from the sample area to the spatial detector that pass through different portions of the variable filter having different wavelength response characteristics.

As stated in the summary of the invention section of this application, systems according to the invention are advantageous in that they can perform precise spectral imaging and